



**AOL1424**

**N-Channel Enhancement Mode Field Effect Transistor**



### General Description

The AOL1424 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V, while retaining a 20V  $V_{GS(MAX)}$  rating. It is ESD protected. This device is suitable for use as a load switch. *Standard Product AOL1424 is Pb-free (meets ROHS & Sony 259 specifications).*

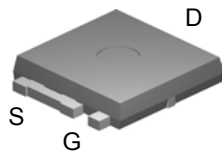
### Features

$V_{DS}$  (V) = 30V  
 $I_D$  = 70A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 5.4m\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 8m\Omega$  ( $V_{GS}$  = 4.5V)

ESD Protected

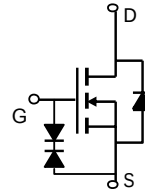
**UIS Tested!**  
 **$R_g$ ,  $C_{iss}$ ,  $C_{oss}$ ,  $C_{rss}$  Tested**

Ultra SO-8™ Top View



Bottom tab  
connected to  
drain

**Fits SOIC8  
footprint !**



### Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

| Parameter                                          | Symbol         | Maximum    | Units            |
|----------------------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                               | $V_{DS}$       | 30         | V                |
| Gate-Source Voltage                                | $V_{GS}$       | $\pm 20$   | V                |
| Continuous Drain Current <sup>B</sup>              | $I_D$          | 70         | A                |
| $T_C=25^\circ\text{C}$                             |                |            |                  |
| $T_C=100^\circ\text{C}$                            |                | 50         |                  |
| Pulsed Drain Current <sup>C</sup>                  | $I_{DM}$       | 120        |                  |
| Continuous Drain Current <sup>A</sup>              | $I_{DSM}$      | 23         | A                |
| $T_A=25^\circ\text{C}$                             |                |            |                  |
| $T_A=70^\circ\text{C}$                             |                | 18         |                  |
| Avalanche Current <sup>H</sup>                     | $I_{AR}$       | 30         | A                |
| Repetitive avalanche energy $L=0.3mH$ <sup>H</sup> | $E_{AR}$       | 135        | mJ               |
| Power Dissipation <sup>B</sup>                     | $P_D$          | 50         | W                |
| $T_C=25^\circ\text{C}$                             |                |            |                  |
| $T_C=100^\circ\text{C}$                            |                | 25         |                  |
| Power Dissipation <sup>A</sup>                     | $P_{DSM}$      | 5          | W                |
| $T_A=25^\circ\text{C}$                             |                |            |                  |
| $T_A=70^\circ\text{C}$                             |                | 3          |                  |
| Junction and Storage Temperature Range             | $T_J, T_{STG}$ | -55 to 175 | $^\circ\text{C}$ |

### Thermal Characteristics

| Parameter                                | Symbol          | Typ | Max | Units              |
|------------------------------------------|-----------------|-----|-----|--------------------|
| Maximum Junction-to-Ambient <sup>A</sup> | $R_{\theta JA}$ | 20  | 24  | $^\circ\text{C/W}$ |
| $t \leq 10s$                             |                 |     |     |                    |
| Maximum Junction-to-Ambient <sup>A</sup> |                 | 45  | 55  | $^\circ\text{C/W}$ |
| Steady-State                             |                 |     |     |                    |
| Maximum Junction-to-Case <sup>D</sup>    | $R_{\theta JC}$ | 2.5 | 3.0 | $^\circ\text{C/W}$ |
| Steady-State                             |                 |     |     |                    |

Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

| Symbol                      | Parameter                             | Conditions                                                                                 | Min | Typ        | Max        | Units |
|-----------------------------|---------------------------------------|--------------------------------------------------------------------------------------------|-----|------------|------------|-------|
| <b>STATIC PARAMETERS</b>    |                                       |                                                                                            |     |            |            |       |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage        | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                                 | 30  |            |            | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                          |     |            | 1<br>5     | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current             | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±16V                                                |     |            | 10         | μA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA                                     | 1.4 | 1.8        | 2.5        | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =10V, V <sub>DS</sub> =5V                                                  | 120 |            |            | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =10V, I <sub>D</sub> =20A<br>T <sub>J</sub> =125°C                         |     | 4.5<br>6.3 | 5.4<br>7.6 | mΩ    |
|                             |                                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                                 |     | 6.5        | 8.0        | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =20A                                                   |     | 67         |            | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                    |     | 0.7        | 1.0        | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |                                                                                            |     |            | 70         | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |                                                                                            |     |            |            |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz                                          |     | 1803       | 2170       | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                            |     | 387        |            | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                            |     | 238        |            | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                           |     | 1.3        | 2          | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                            |     |            |            |       |
| Q <sub>g</sub> (10V)        | Total Gate Charge                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A                            |     | 36         | 48         | nC    |
| Q <sub>g</sub> (4.5V)       | Total Gate Charge                     |                                                                                            |     | 19         |            | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                            |     | 3.9        |            | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                            |     | 8.7        |            | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω,<br>R <sub>GEN</sub> =3Ω |     | 7.6        |            | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                            |     | 6.4        |            | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                            |     | 27         |            | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                            |     | 8.5        |            | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =20A, dI/dt=100A/μs                                                         |     | 27         | 33         | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =20A, dI/dt=100A/μs                                                         |     | 17         |            | nC    |

A: The value of R<sub>θJA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25°C. The power dissipation P<sub>DSM</sub> and current rating I<sub>DSM</sub> are based on T<sub>J(MAX)</sub>=150°C, using t ≤ 10s junction-to-ambient thermal resistance.

B: The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=175°C.

D: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=175°C.

G: These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

H: EAR and IAR ratings are based on low frequency and duty cycles such that T<sub>J(start)</sub>=25°C for each pulse.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

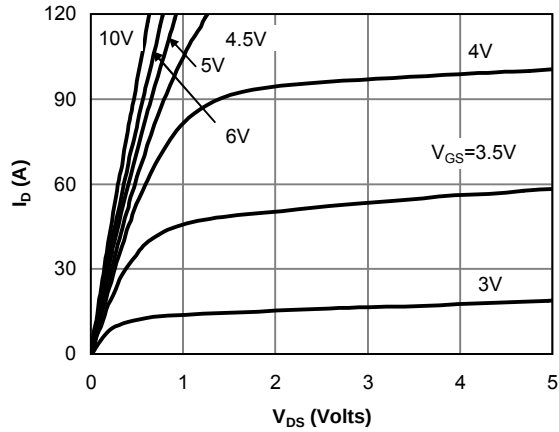


Figure 1: On-Region Characteristics

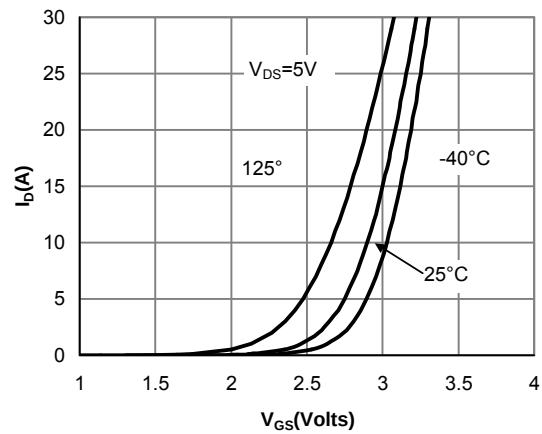


Figure 2: Transfer Characteristics

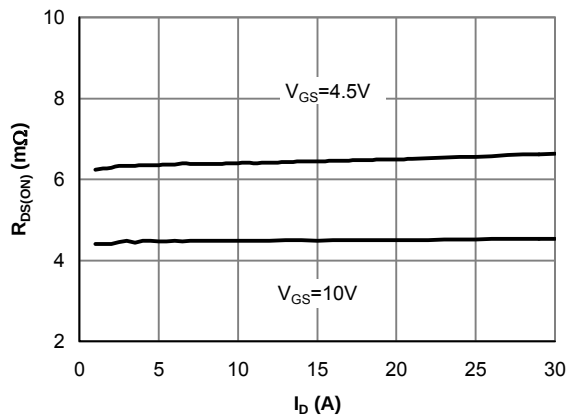


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

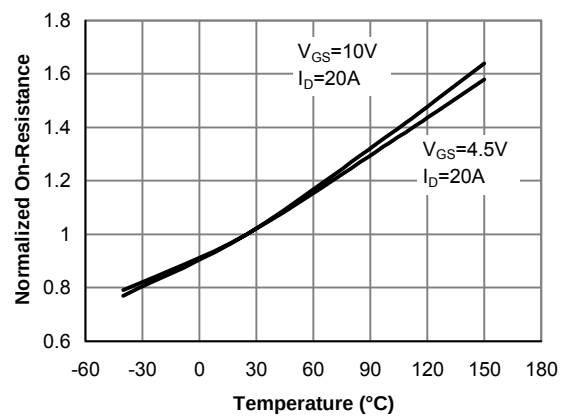


Figure 4: On-Resistance vs. Junction Temperature

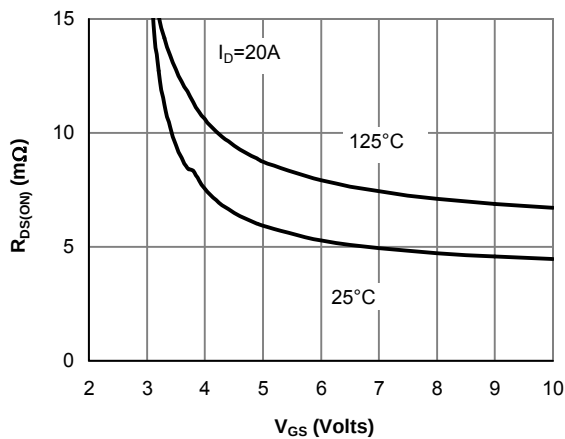


Figure 5: On-Resistance vs. Gate-Source Voltage

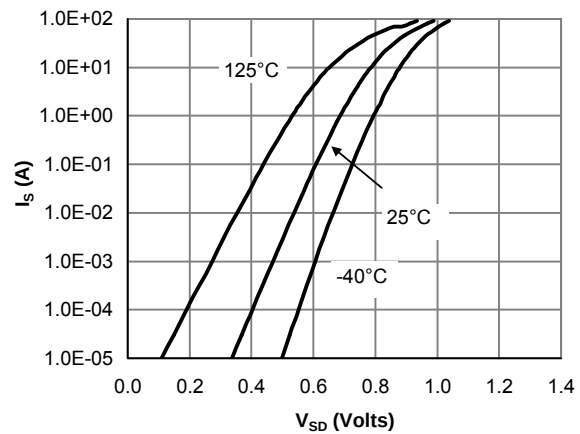
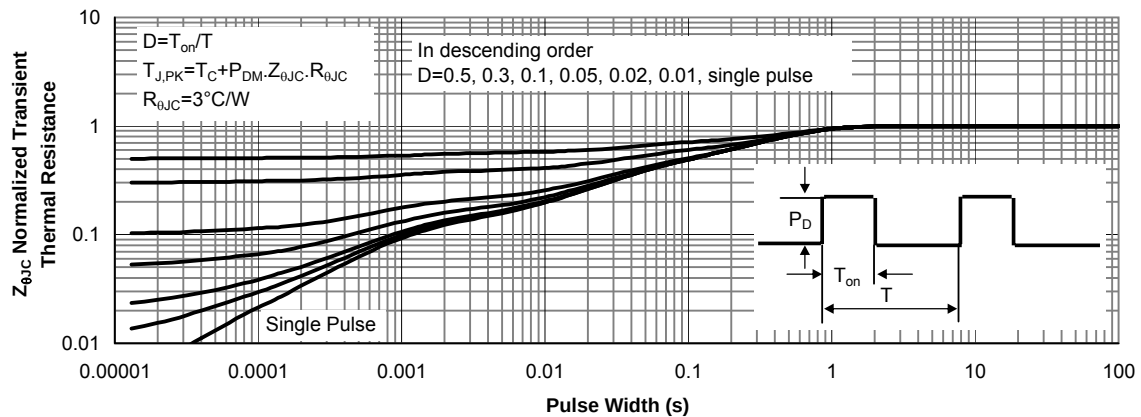
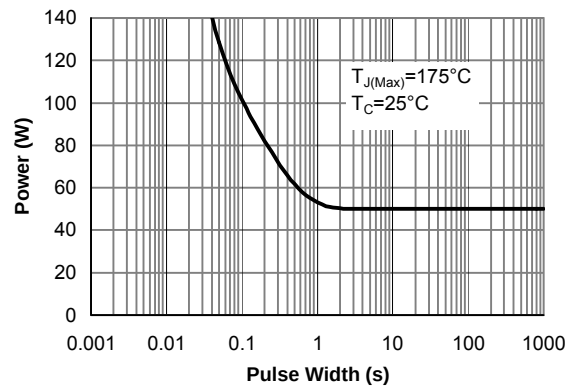
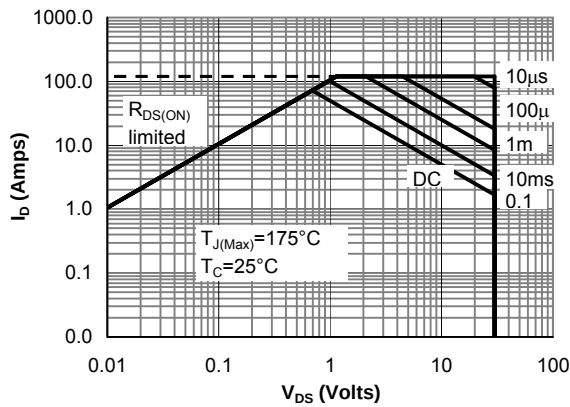
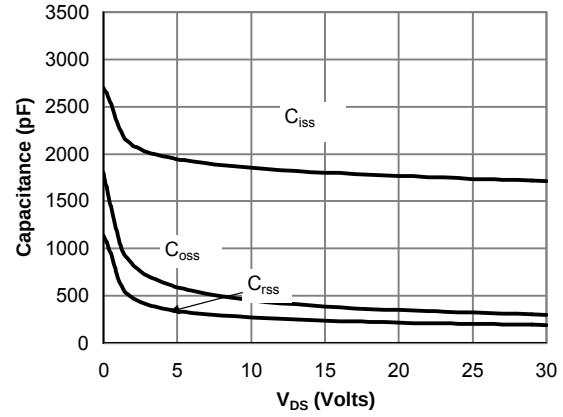
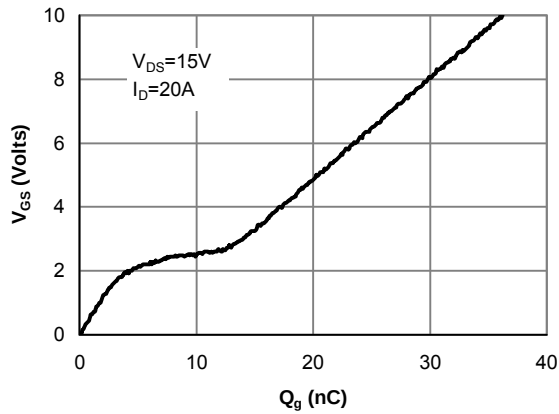


Figure 6: Body-Diode Characteristics

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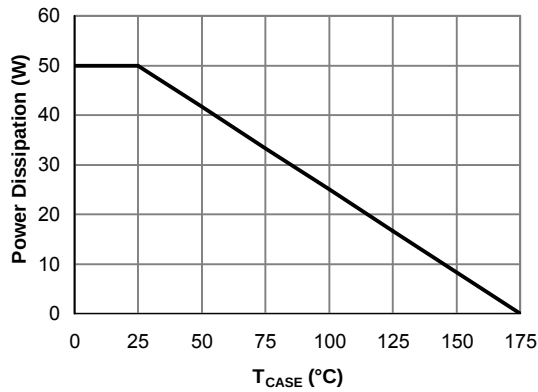


Figure 12: Power De-rating (Note B)

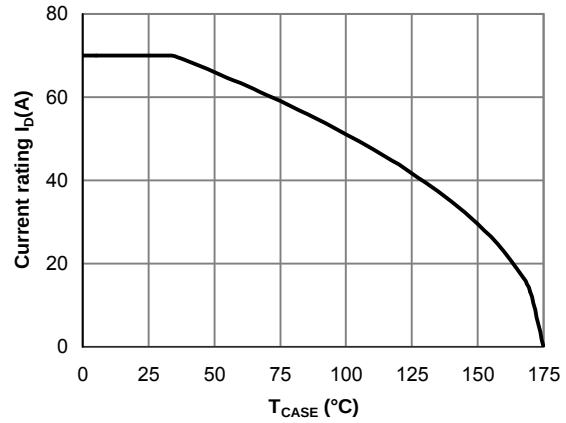


Figure 13: Current De-rating (Note B)

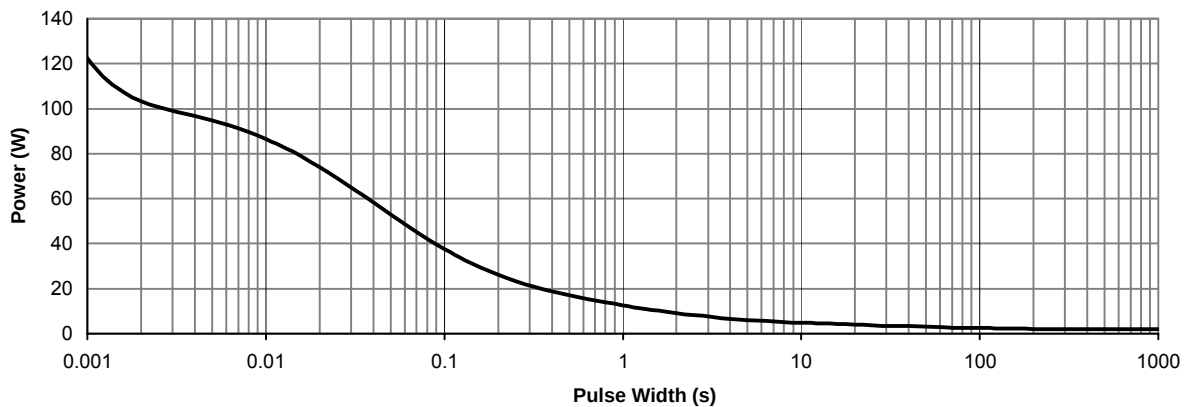


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

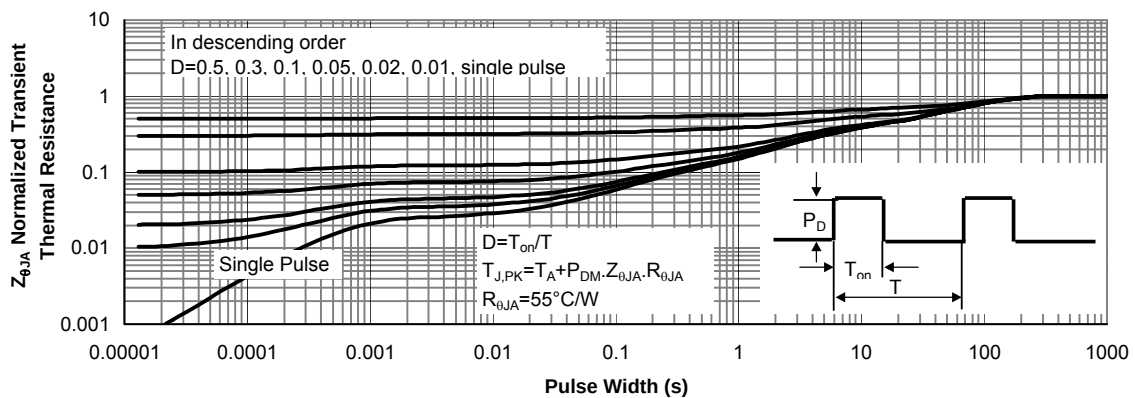


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)